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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/864,208	05/25/2001	Norio Kimura	2001_0660A	1632

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WENDEROTH, LIND & PONACK, L.L.P.
2033 K STREET N. W.
SUITE 800
WASHINGTON, DC 20006-1021

EXAMINER	
MACARTHUR, SYLVIA	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 05/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

CF

Office Action Summary	Application No.	Applicant(s)	
	09/864,208	KIMURA ET AL.	
	Examiner	Art Unit	
	Sylvia R MacArthur	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 February 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) ~~16-37~~ 14 is/are pending in the application.

4a) Of the above claim(s) 14/15 is/are withdrawn from consideration. dm

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *16-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/6/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of claims 16-37 mailed 2/3/2004 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 16-21, 23-28, 30-35, and 37 are rejected under 35 U.S.C. 103(a) as being obvious over Wilson et al

(US 6,251,789) in view of Lehman et al (US 6,621,264).

Regarding claims 16 and 23:

Wilson teaches a method of fabricating a semiconductor device. The method comprises the steps of using CMP to polishing a liner (made of metal) layer with one slurry and polishing another metal layer with different slurry. Wilson teaches in col.4 lines 60-65 that an optical endpoint measurement system is used in the process.

Wilson fails to teach the step of using an eddy current monitor to measure the film thickness.

Lehman et al teaches a method of measuring the thickness of substrate using eddy current probe in col.5 lines 45-62.

Lehman teaches that the motivation of using an eddy current probe is that it is a suitable means of detecting the endpoint. It is noted in col. 2 lines 1-6 that when an endpoint is reached process conditions (such as a change in slurry) can be changed.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to polish one metal layer with a slurry as Wilson teaches, check for the endpoint of that polishing step with an eddy current probe as Lehman teaches, and repeat the process by polishing another metal layer with another slurry and detect its endpoint by using the combined teachings of Wilson and Lehman.

Regarding Claims 17 and 24: Wilson includes water as a constituent for the slurry, according to col. 4 line 47.

Regarding Claims 18, 19, 25, and 26:

The teachings of Wilson were discussed

Wilson fails to teach the changing of other process conditions besides the slurry.

Lehman teaches that process conditions can be changed. Both the load and speed are known process conditions.

The motivation to change the load and speed are that both affect the process result and are optimizable process conditions dependent upon the type of slurry used, the type of layer polished, and the desired result.

Thus, it would have been obvious at the time of the claimed invention to change the load and speed of polishing.

Regarding claims 20 and 27: Wilson fails to teach third slurry, however the duplication of parts was held to have been obvious according to In re Harza.

Additionally, Wilson does teach that the slurry can comprise an alkaline or basic solution, see col. 4 lines 42-47.

Regarding claims 21, 28, and 35: Wilson fails to teach acidic slurry.

However the type of slurry is an art recognized utilizable parameter.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention would have known at the time of the claimed invention to utilize an acidic slurry in order to polish the metal layer.

Regarding claim 30: Wilson teaches a method of fabricating a semiconductor device. The method comprises the steps of using CMP to polishing a liner (made of metal) layer with one slurry and polishing another metal layer with different slurry. Wilson teaches in col.4 lines 60-65 that an optical endpoint measurement system is used in the process.

Wilson fails to teach the step of using an eddy current monitor to measure the film thickness.

Lehman et al teaches a method of measuring the thickness of substrate using an SEM imaging technique in col. 1 lines 23-52.

Lehman teaches that the motivation of using a SEM imaging technique is that it is a suitable means of detecting the endpoint. It is noted in col. 2 lines 1-6 that when an endpoint is reached process conditions (such as a change in slurry) can be changed.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to polish one metal layer with a slurry as Wilson teaches, check for the endpoint of that polishing step with a SEM imaging technique as Lehman teaches, and repeat the

process by polishing another metal layer with another slurry and detect its endpoint by using the combined teachings of Wilson and Lehman.

Regarding claim 31: Wilson includes water as a constituent for the slurry, according to col. 4 line 47.

Regarding claims 32 and 33: The teachings of Wilson were discussed

Wilson fails to teach the changing of other process conditions besides the slurry.

Lehman teaches that process conditions can be changed. Both the load and speed are known process conditions.

The motivation to change the load and speed are that both affect the process result and are optimizable process conditions dependent upon the type of slurry used, the type of layer polished, and the desired result.

Thus, it would have been obvious at the time of the claimed invention to change the load and speed of polishing.

Regarding claim 34: Wilson fails to teach a third slurry, however the duplication of parts was held to have been obvious according to In re Harza.

Additionally, Wilson does teach that the slurry can comprise an alkaline or basic solution, see col. 4 lines 42-47.

Regarding claim 37: Wilson teaches a method of fabricating a semiconductor device. The method comprises the steps of using CMP to polishing a liner (made of metal) layer with one slurry and polishing another metal layer with different slurry. Wilson teaches in col.4 lines 60-65 that an optical endpoint measurement system is used in the process.

Wilson fails to teach the step of using an eddy current monitor to measure the film thickness.

Lehman et al teaches a method of measuring the thickness of substrate using eddy current probe in col.5 lines 45-62 and optical sensor (fiber optic measuring device), see col. 13 lines 15-22.

Lehman teaches that the motivation of using an eddy current probe is that it is a suitable means of detecting the endpoint. It is noted in col. 2 lines 1-6 that when an endpoint is reached process conditions (such as a change in slurry) can be changed.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to polish one metal layer with a slurry as Wilson teaches, check for the endpoint of that polishing step with an eddy current probe as Lehman teaches, and repeat the process by polishing another metal layer with another slurry and detect its endpoint by using the combined teachings of Wilson and Lehman.

4. Claims 22, 29, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson and Lehman as applied to claims 16-21, 23-28, 30-35, and 37 above, and further in view of Allen et al (US 6,292,708).

The teachings of Wilson and Lehman were discussed above.

Specifically, Lehman teaches storing the thickness measurement data, according to col.6 lines 1-7.

Wilson and Lehman fail to teach a cleaning and drying step.

Allen et al teaches a distributed control system for a semiconductor wafer processing machine via a multichamber processing tool. The tool consists of a cleaning station 108 and a drying station 112

The motivation to provide a cleaning and drying step in the method of Wilson modified by Lehman is to provide a wafer processing system that polishes, cleans, dries, and measures endpoint in one continuous process, such that there is no need for separate machines and the associated downtime as discussed in col. 3 lines 54-57.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modified the method of Wilson and Lehman with the teachings of Allen et al.

Response to Arguments

5. Applicant's arguments with respect to claims 1-16 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-F during the core hours of 8 a.m. and 2 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sylvia R MacArthur
Patent Examiner
Art Unit 1763

May 12, 2004

GREGORY MILLS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700